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MBA I Semester
M-108
Business Statistics and Analytics for Decision Making
Sample Questions

Part A: Short answer question (up to 25 words)

Part B: Analytical/ problem Solving questions

Part C: Descriptive/ Analytical/ Problem Solving/ Case questions.

Part A

Unit 1

Q1 What is matrix?
Q2 Define the following terms:

- Elements matrix
- diagonal matrix
- scalar Matrix
- unit Matrix
- triangular matrix

Q3 "Every identity matrix is a diagonal Matrix" true or false? Justify your answer.
Q4 Define inverse of a matrix.
Q5 What do you mean by the principal diagonal of the matrix?
Q6 "Matrix multiplication is always commutative" true or false? Justify your answer
Q7 What is transpose of a matrix?

Unit 2

Q8 What is input-output model in mathematics?
Q9 How is Leontief matrix calculated?
Q10 What is the formula of Cramer's rule?
Q11 Who has given the input-output model?
Q12 What is input-output ratio?

Unit 3

Q13 What is mean by mean?
Q14 Write two types of mean.
Q15 Write one merit of median.
Q16 Find mode 10,5,4,6,4,5,4,12,4,15,4
Q17 Write the formula of combined mean.
Q18 Define quartile.
Q19 Define median
Q20 What is the relationship b/w mean, median and mode?
Q21 What is the sum of derivations taken from mean in a series?
Q22 State one objective of an average.
Q23 Name the most popular statistical average.
Q24 Find median of 4,9,10,12,14
Q25 State one disadvantage of mode.
Q26 What is the coefficient of dispersion?

Q27 Explain the interquartile range.

Unit 4

Q28 Define correlation.
Q29 Define partial correlation.
Q30 Define the line of best fit.
Q31 When is the rank correlation method used?
Q32 What is a simple correlation?
Q33 What is a multiple correlation?
Q34 State in each case whether there is
(a) Positive Correlation
(b) Negative Correlation
(c) No Correlation

Sl No	Particulars
1	Price of commodity and its demand
2	Yield of crop and amount of rainfall
3	No of fruits eaten and hungry of a person
4	No of units produced and fixed cost per unit
5	No of girls in the class and marks of boys
6	Ages of Husbands and wife
7	Temperature and sale of woollen garments
8	Number of cows and milk produced
9	Weight of person and intelligence
10	Advertisement expenditure and sales volume

Unit 5

Q35 What is *Linear Regression*?
Q36 What is regression coefficients?
Q37 Mention two regression equation
Q38 What are the uses of Regression Analysis?
Q39 Mention method to determine the parameters of a regression equation.
Q40 Which techniques help to provide the prediction mechanism of the relationship between two variables?

Unit 6

Q41 Define index number.
Q42 What is a simple index number?
Q43 Define weighted index number.

Q44 Explain price relative.
Q45 Define consumer price index number.
Q46 What is the wholesale price index?
Q47 State the two types of price index numbers.

Unit 7

Q48 What is probability formula?
Q49 What is basic probability?
Q50 What are the different types of events in probability?
Q51 What is certain probability?
Q52 What is the probability of likely and unlikely event ?
Q53 What are the 2 basic rules of probability?
Q54 Write the difference union and intersection.
Q55 Define mutually exclusive event.
Q56 What is a conditional probability ?
Q57 What are the different types of theoretical distributions?
Q58 What is binomial Poisson and normal distribution?

Unit 8

Q59 What is the time value in money?
Q60 What do you mean by sinking fund?
Q61 Explain compounding technique?
Q62 Define terminal value.
Q63 Write down the Formula of Future Value.

Part B

Unit 1

Q1 If A is a matrix of order p*q and B is a matrix of order q*r, then what is the order of the product of matrix AB?
Q2 The difference between a matrix and a determinant.
Q3 Which are the properties of the transport of a matrix?
Q4 What is necessary condition for matrix multiplication?

Unit 2

Q5 What is Cramer's rule 3x3?
Q6 How does Gauss-Jordan method solve matrices?
Q7 What is technology matrix in input-output analysis?
Q8 What is echelon and reduced echelon form?
Q9 Why is Cramer's rule important?

Unit 3

Q. 10 What is the standard deviation for the data given?

5, 10, 7, 12, 0, 20, 15, 22, 8, 2

Q11 Define mean deviation.
Q12 What is standard deviation?
Q13 What is Mean, Median and Mode?
Q14 What is the relation between Arithmetic, Geometric and Harmonic Mean.
Q15 If in an asymmetrical distribution median is 28 and mean is 31. What will be the value of mode?
Q16 The mean of 10 items was 70. Later on it was found out that one item 92 was misread as 29. What was the correct mean?
Q17 Average marks of 26 students of Section A of class XI is 73 and average marks of 24 students of Section B of class XI is 86. Find out the average marks of class XI.

Unit 4

Q18 Explain the principal methods for calculating the coefficient of correlation.
Q19 What is the difference between negative and positive correlations?
Q20 What is the nature of the correlation of two variables when they move in the same direction?
Q21 The coefficient of correlation is between -1 and +1. Express it arithmetically.

Q22 Coefficient of correlation between X and Y is 0.3. Their covariance is 9. The variance of X is 16. Find the standard devotion of Y series.
Q23 The coefficient of rank correlation of the marks obtained by 10 students in statistics and accountancy was found to be 0.8. It was later discovered that the difference in ranks in the two subjects obtained by one of the students was wrongly taken as 7 instead of 9. Find the correct coefficient of rank correlation.

Unit 5

Q24 What is meant by dependent and independent variables? (y is dependent, x are independents)
Q25 Mention the properties of regression coefficients.
Q26 What does regression coefficient indicate? Is it possible that one coefficient has a positive value whereas the other happens to be negative? If not why.
Q27 What is basic difference between correlation and regression analysis.

Unit 6

Q28 Name one principal limitation of index numbers.

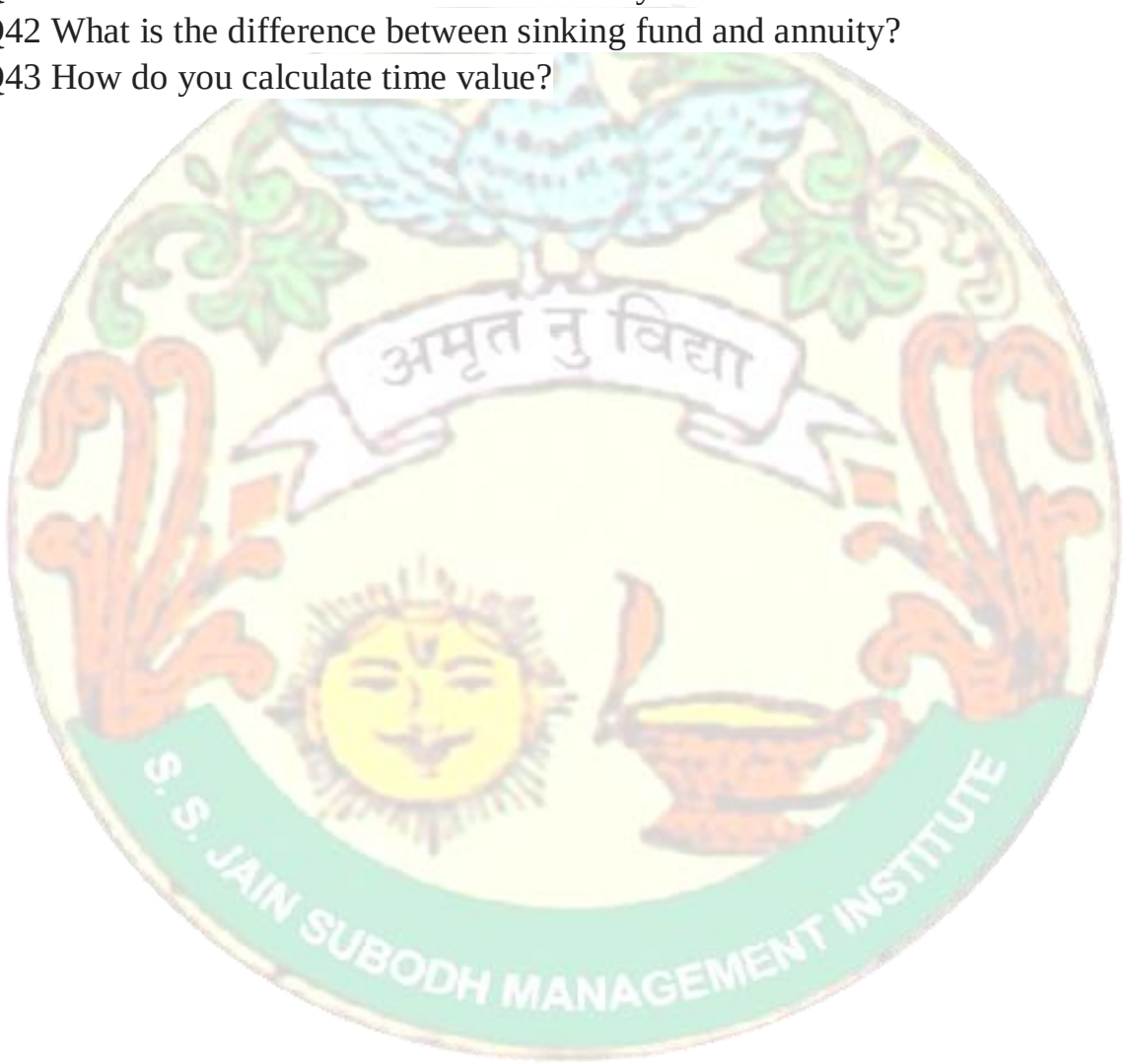
Unit 7

Q29 A coin is thrown 3 times .what is the probability that atleast one head is obtained?
Q30 Find the probability of getting a numbered card when a card is drawn from the pack of 52 cards.
Q31 There are 5 green 7 red balls. Two balls are selected one by one without replacement. Find the probability that first is green and second is red.
Q32 What is the probability of getting a sum of 7 when two dice are thrown?
Q33 1 card is drawn at random from the pack of 52 cards.
(i) Find the Probability that it is an honor card.
(ii) It is a face card.
Q34 Two cards are drawn from the pack of 52 cards. Find the probability that both are diamonds or both are kings.
Q35 Three dice are rolled together. What is the probability as getting at least one '4'?
Q36 From a pack of cards, three cards are drawn at random. Find the probability that each card is from different suit.

Q37 Find the probability that a leap year has 52 Sundays.

Unit 8

Q38 What are the 3 elements of time value of money?
Q39 What is a sinking fund and how does it work?
Q40 What is the difference between nominal rate compounded rate and effective rate?
Q41 Which method uses time value of money?
Q42 What is the difference between sinking fund and annuity?
Q43 How do you calculate time value?



Part C

Unit 1

1. Let $A = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$

(i) Find the matrix C(B – A).

(ii) Find A(B + C).

(iii) Prove that A(B + C) = AB + AC.

2. If $A = \begin{bmatrix} 3 & 2 \\ 1 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 3 \\ 0 & 1 \end{bmatrix}$ then verify the truth of the following.

(i) $(A + B)^2 = A^2 + B^2 + 2AB$

(ii) $(A + B)(A - B) = A^2 - B^2$

3. If $X = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$, show that $6X - X^2 = 9I$, where I is the unit matrix.

4. (i) Show that $X = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ satisfies the relation $X^2 - 2X - 3I = O$, where I is the unit matrix of order 2 × 2 and O is the null matrix of order 2 × 2.

Q5 Find IAI

$$\text{If } A = \begin{bmatrix} 3 & 2 & 1 \\ 0 & 1 & -2 \\ 1 & 3 & 4 \end{bmatrix}$$

Q6.

Find the inverse, if it exists, of the matrix.

$$A = \begin{bmatrix} 0 & -2 & -3 \\ 1 & 3 & 3 \\ -1 & -2 & -2 \end{bmatrix}$$

Unit 2

Q7

Use matrices to find the solution set of

$$x + y - 2z = 3$$
$$3x - y + z = 5$$
$$3x + 3y - 6z = 9$$

Q8

Use matrices to find the solution set of

$$4x + 8y + z = -6$$
$$2x - 3y + 2z = 0$$
$$x + 7y - 3z = -8$$

Q9

Solve the equations using Gauss Jordan method.

$$x + 2y + 6z = 22$$
$$3x + 4y + z = 26$$
$$6x - y - z = 19$$

Q10

The following inter – industry transactions table was constructed for an economy of the year 2016.

Industry	1	2	Final consumption	Total output
1	500	1,600	400	2,500
2	1,750	1,600	4,650	8,000
Labours	250	4,800	-	-

Construct technology co-efficient matrix showing direct requirements. Does a solution exist for this system.

Unit 3

Q11 Calculate arithmetic mean from the following data: (Using assume mean method)

X	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50
F	5	15	55	75	100

Q12 Calculate mode of the following series:

Class	10-19	20-29	30-39	40-49	50-59	60-69	70-79
Frequency	10	12	18	30	16	6	8

Q13 Calculate median from the following data:

Marks	More than 0	More than 10	More than 20	More than 30	More than 40	More than 50
No of Students	50	42	38	28	16	3

Q14 Find the range and coefficient of range of the following data.

(i) 63, 89, 98, 125, 79, 108, 117, 68

(ii) 43.5, 13.6, 18.9, 38.4, 61.4, 29.8

Q15 A teacher asked the students to complete 60 pages of a record note book. Eight students have completed only 32, 35, 37, 30, 33, 36, 35 and 37 pages. Find the standard deviation of the pages yet to be completed by them.

Q16 The rainfall recorded in various places of five districts in a week are given below.

Rainfall (in mm)	45	50	55	60	65	70
Number of places	5	13	4	9	5	4

Find its standard deviation.

Q17 In a study about viral fever, the number of people affected in a town were noted as

Age in years	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of people affected	3	5	16	18	12	7	4

Find its standard deviation.

Q18 For a group of 100 candidates the mean and standard deviation of their marks were found to be 60 and 15 respectively. Later on it was found that the scores 45 and 72 were wrongly entered as 40 and 27. Find the correct mean and standard deviation.

Unit 4

Q19

From following information find the correlation coefficient between advertisement expenses and sales volume using Karl Pearson's coefficient of correlation method.

Firm	1	2	3	4	5	6	7	8	9	10
Advertisement Exp. (Rs. In Lakhs)	11	13	14	16	16	15	15	14	13	13
Sales Volume (Rs. In Lakhs)	50	50	55	60	65	65	65	60	60	50

Q20

Find the correlation coefficient between age and playing habits of the following students using Karl Pearson's coefficient of correlation method.

Age	15	16	17	18	19	20
Number of students	250	200	150	120	100	80
Regular Players	200	150	90	48	30	12

Q21

A computer while calculating the correlation coefficient between the variable X and Y obtained the following results:

$N = 30;$ $\sum X = 120$ $\sum X^2 = 600$ $\sum Y = 90$ $\sum Y^2 = 250$ $\sum XY = 335$

It was, however, later discovered at the time of checking that it had copied down two pairs of observations as: (X, Y) : (8, 10) (12, 7)

While the correct values were: (X, Y) : (8, 12) (10, 8)

Obtain the correct value of the correlation coefficient between X and Y.

Q22

Calculate correlation coefficient from the following two-way table, with X representing the average salary of families selected at random in a given area and Y representing the average expenditure on entertainment.

Expenditure on	**Average Salary (Rs. '000)**				
Entertainment (Rs. '000)	100-150	150-200	200-250	250-300	300-350
0 – 10	5	4	5	2	4
10 – 20	2	7	3	7	1
20 – 30	-	6	-	4	5
30 – 40	8	-	4	-	8
40 – 50	-	7	3	5	10

Q23

Find out spearman's coefficient of correlation between the two kinds of assessment of graduate students' performance in a college.

Name of students	A	B	C	D	E	F	G	H	I
Internal Exam	51	68	73	46	50	65	47	38	60
External Exam	49	72	74	44	58	66	50	30	35

Q24

From the following data, compute the rank correlation.

X	82	68	75	61	68	73	85	68
Y	81	71	71	68	62	69	80	70

Unit 5

Q25

From the following information find regression equations and estimate the production

when the capacity utilisation is 70%.

Average (Mean) Standard Deviation

Production (in lakh units) 42 12.5

Capacity Utilisation (%) 88 8.5
Correlation Coefficient (r) 0.72

Q26
Find the covariance for the following data.
(a) Height (m) x 1.60 1.64 1.71
Weight (kg) y 53 57 60
(b) Height (cm) x 160 164 171
Weight (kg) y 53 57 60

Q27 Find the two regression equation of X on Y and Y on X from the following data:

X :	10	12	16	11	15	14	20	22
Y :	15	18	23	14	20	17	25	28

Q28 After investigation it has been found the demand for automobiles in a city depends mainly, if not entirely, upon the number of families residing in that city. Below are the given figures for the sales of automobiles in the five cities for the year 2022 and the number of families residing in those cities.

City	No. of Families (in lakhs): X	Sale of automobiles (in '000): Y
Belagavi	70	25.2
Bangalore	75	28.6
Hubli	80	30.2
Kalaburagi	60	22.3
Mangalore	90	35.4

Fit a linear regression equation of Y on X by the least square method and estimate the sales for the year 2023 for the city Belagavi which is estimated to have 100 lakh families assuming that the same relationship holds true.

Q29
From the following data obtain the two regression lines:

Capital Employed (Rs. in lakh):	7	8	5	9	12	9	10	15
Sales Volume (Rs. in lakh):	4	5	2	6	9	5	7	12

Q30
The following data gives the age and blood pressure (BP) of 10 sports persons.

Name :	A	B	C	D	E	F	G	H	I	J
Age (X) :	42	36	55	58	35	65	60	50	48	51
BP (Y) :	98	93	110	85	105	108	82	102	118	99

i. Find regression equation of Y on X and X on Y (Use the method of deviation from arithmetic mean)

ii. Find the correlation coefficient (r) using the regression coefficients.
iii. Estimate the blood pressure of a sports person whose age is 45.

Unit 6

Q31
Using Simple Aggregate Method and Price Relatives Method, find out index values for the year 2017 from the following data:

Items	A	B	C	D	E
2004 Price	(₹) 15	33	38	25	50
2017 Price	(₹) 30	35	57	35	63

Q32
Find out index value by the Price Relative Method for the year 2017 from the following data:

Items	A	B	C	D	E	F	G
2004 Price	(₹) 100	10	5	4	1	2	3
2017 Price	(₹) 100	9	4	2	1	2.5	2.25

Q33
Construct an index number by Price Relatives Method using 2004 as base year:

Goods	A	B	C	D
2004 Price	(₹) 8	10	15	20
2016 Price	(₹) 10	12	18	22
2017 Price	(₹) 12	14	20	25

Q34
Construct price index number of the following data by using:
(i) Laspeyre's Method, (ii) Paasche's Method, and (iii) Fisher's Method.

Items	Base Year		Current Year	
	Quantity	Price	Quantity	Price
A	3	5	2	8
B	7	4	5	6
C	4	7	3	10
D	6	6	5	7

Unit 7

Q35 Three bags contain 3 red, 7 black; 8 red, 2 black, and 4 red & 6 black balls respectively. 1 of the bags is selected at random and a ball is drawn from it. If the ball drawn is red, find the probability that it is drawn from the third bag.

Q36 A coin is tossed 10 times. Assuming the coin to be unbiased, what is the probabilityof getting
(i) 4 heads?
(ii) at least 4 heads?
(iii) at most 3 heads

Q37 Between 9 and 10 AM, the average number of phone calls per minute coming into
the switchboard of a company is 4. Find the probability that during one particular minute, therewill be,
1. no phone calls
2. at most 3 phone calls (given e–4 = 0.018316)

Q38 If 2 per cent of electric bulbs manufactured by a company are known to be
defectives, what is the probability that a sample of 150 electric bulbs taken from the productionprocess of that company would contain
1. exactly one defective bulb?
2. more than 2 defective bulbs?

Q39 In a sample of 500 workers of a factory, the mean wage and SD of wages are
found to be 500 and 48 respectively. Find the number of workers having wages:
(i) more than 600
(ii) less than 450
(iii) between 548 and ` 600

Unit 8

Q40 Find compound interest on Rs.7500 at 4% per annum for 2 years ,compounded annually.

Q41 Find compound interest on Rs.8000 at 15% per annum for 2 years 4 months ,compounded annually.

Q42 Find compound interest on Rs.16000 at 20% per annum for 9 months, compounded quarterly.

Q43 In what time will Rs.1000 become Rs.1331 at 10% per annum ,compounded annually.

Q44 At what rate Rs.1000 will become Rs.1331 in 3years,compounded annually.

Q45 XYZ places his savings or Rs.1000 in a two year time deposit scheme of a bank which yield interest @ 6 % p.a. compounded semi-annually .Find the amount that XYZ will receive at the end of two years.

What will be the amount receive at end of two years and interest compounded quarterly?

Q46 Mr.Shyam is depositing Rs. 2000 **at the end** of each year in a recurring bank deposit which pays 9% p.a. compounded interest. How much account Mr. Shyam get at an end of 5^{th} year.

Q47 Mr.Gopal deposits Rs. 100000 at the **beginning of each year** in a recurring bank deposit which pays 10% p.a. compounded interest. How much account Mr. Gopal get at an end of 4^{th} year.